UNITED STATES OF AMERICA (*IAAP*)

(Middletown, Iowa)

GENERAL DESCRIPTION

The Iowa Army Ammunition Plant (IAAP) is owned by the United States Army and operated by a private contractor. The 19,127-acre secured facility (30 square miles) is in a rural setting. The facility is located in Sections 34, 35, 36, T70N, R4W; Sections 31, 32, 33, 34, T70N, R3W; Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 23, 24, T69N, R4W; Sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, T69N, R3W, in Des Moines County, Iowa. The IAAP was included on the National Priority List (NPL) in August 1990.

Production of war supplies for World War II began in September 1941 and ended in August 1945. Production of munitions was resumed in 1949 and has continued to the present. From 1947 to 1973, the former Atomic Energy Commission operated facilities at the site, which reverted to Army control in 1973. Line 8 was used from 1946 until 1950 to produce nitrogen fertilizer in support of the Marshall Plan.

Only a few of the IAAP production lines are currently operating to load, assemble, and pack (LAP) various ammunition items. These include projectiles, mortar rounds, warheads, demolition charges, anti-tank mines, anti-personnel mines, and the components of these munitions such as primers, detonators, fuses, and boosters. The LAP operations use explosive material and lead-based initiating compounds.

Registry Sites: Three areas within the army facility were listed on the Registry. The names and locations of each of the four sites on the Registry are generally described as follows:

- **Pink Water Lagoon (Line 800)**: It is located in the S ½ of Section 8, T69N, R3W, Des Moines County, Iowa.
- **RDX Brush Creek Site (Former Line #1 Impoundment)**: It is located in the N ½ of Section 5, T69N, R3W, Des Moines County, Iowa and is on the Brush Creek channel.
- **Herbicide/Pesticide Pit**: It was located in the SW ¼ of Section 8, T69N, R3W, Des Moines County, Iowa.

SITE CLASSIFICATION

Classifications assigned for the three individual operable units or OU's:

Pink Water Lagoon: It is classified **"b"** in accordance with 455B.427.3. The site poses a significant threat to the environment. Further action is required to monitor the movement of contamination and to remove or cap the source of contamination.

RDX Brush Creek Site: It is classified **"b"** in accordance with 455B.427.3. The contamination of surface water and groundwater poses a significant threat to the environment. Further action is required.

Herbicide/Pesticide Pit: It is classified **"d"** in accordance with 455B.427.3. The site is properly closed, but requires continued groundwater monitoring.

TYPE AND QUANITY OF HAZARDOUS WASTE

The IAAP facility has many areas with soil, surface water, or groundwater contamination. Most of these areas were not identified or evaluated by investigation activities until 1991. The site was used by IAAP as a landfill from 1941 until 1991. The landfill consists of six trenches, which were used for the disposal of approximately 3,000 tons of sanitary waste a year. From November 1980 to October 1983, a portion of Trench 5 also received ash from open burning explosives and waste from a "contaminated" waste processor and from an explosive waste incinerator. This cell was capped and closed in accordance with RCRA guidelines in 1988. This area also included a sludge drying bed

and a clay lined holding area (Blue Sludge Lagoon) formerly used to store sludge generated from metal cleaning operations. This blue sludge (600 cubic yards) was removed from the drying bed and placed in Trench 6 in 1997.

The contaminants of concern include TNT, lead azide, barium nitrate, fulminate of mercury, PBX, RDX, and antimony sulfate, explosives and metal wastes associated with past and current munition production. In addition, the contaminants of concern include PCBs, radionuclides, and pesticides that are associated with other base activities.

HEALTH AND ENVIRONMENTAL IMPACTS

There are several recreation areas both on-site and in the immediate area surrounding the site. Mathes Lake (also called Long Lake) is on the south central part of the site. The lake had small Boy Scouts of America campsite and was used by local fisherman. The Skunk River runs along the southwest side of the site. The river has two boat access areas and a small park located along its banks.

The IAAP facility has 43 on-site residences used by contract employees and their families. Middletown, Iowa is on the northwest side of the facility. Augusta is an unincorporated town on the south side of the facility with a population of approximately 50. West Burlington, Iowa and Burlington, Iowa are east of the site.

The draft RI report includes an assessment of the threats to human health and the environment posed by the various areas of soil, surface water, and groundwater contamination at site. Exposure to RDX and 2,4,6-T contributed most of the estimated risk to off-site residents and on-site workers. This includes the estimated risks from both the carcinogenic and non-carcinogenic effects of these chemicals.

Contamination was most widespread at six of the 30 sites. These sites were four of the production lines (Line 1, Line 2, Line 3 & Line 3A), the explosive disposal area and the fire training pit. RDX was the most common groundwater contaminant, with the highest value of 1,600 ug/L from a monitoring well at Line 2. Chlorinated solvent compounds and other volatile organic compounds (VOCs) were found in the groundwater at the fire training pit. These VOCs included 1,1-dichloroethene (3,040 ug/L), 1,1,1-trichloroethane (5,000 ug/L), toluene (15,800 ug/L), and benzene 520 ug/L).

- **Surface Water**

Surface water samples taken from Brush Creek have shown RDX contamination as high as 82 ug/L. An RDX value of 29 ug/L was found in Brush Creek at the southern border of the plant. A groundwater sample near the site had RDX contamination at 330 ug/L. A well at the plant's southern border showed an RDX contamination level of 41 ug/L. The plant has an NPDES permit for discharging RDX from several outfalls into Brush Creek. Therefore, some of the RDX in the creek may come from the permitted outfalls.

- **Ground Water**

Contamination of off-site private wells on the south side of the facility has recently been documented and has occurred previously. Five private wells were contaminated with TNT. Activated carbon filters were installed on these wells and maintained by the plant until 1973 when the installation of the industrial wastewater treatment equipment decreased TNT concentrations in Brush Creek. Sampling in 1992 and 1993 at 53 residences showed RDX contamination above the HAL in three wells in the Brush Creek watershed and two wells near the town of Augusta. The highest RDX contamination level was 27.5 ug/L.

The Department of Public Health performed a health survey for a family who lives down gradient of the plant. The family had experienced many illnesses and was concerned the plant had affected their drinking water. The Department of Public Health concluded the plant did not cause the illnesses of the family, but they will continue to observe and periodically re-evaluate the situation.

SUMMARY OF ASSESSMENT, MONITORING OR REMEDIAL ACTIONS

The EPA is the lead agency for the IAAP facility, including the four sites on the Registry. The first comprehensive facility-wide investigation, (Site Investigation) was completed in 1991. In addition to the evaluation of new information, the SI incorporated findings and recommendations from previous studies.

A Remedial Investigation/Feasibility Study (RI/FS) was initiated in July 1992 for 30 of 43 identified solid waste management units at the IAAP facility. The draft Remedial Investigation (RI) report was submitted for review in October 1993. Additional field work for the RI was planned for April through June 1995. A draft Revised RI report was submitted for review in November 1995. A draft Final Revised RI report was submitted for review in May 1996.

The sites at IAAP have been divided into Operable Units.

Operable Unit #1: The Soil OU#1addresses contamination in soils. The Remedial Investigation for the Soils OU is complete. The Final FS report was submitted in November 1997. EPA signed the Record of Decision (ROD) for Operable Unit #1 on September 29, 1998. The selected remedy includes:

1. Remove soils from the CAMU (Trench 7).
2. Transport SVOC-contaminated soils to an off-site treatment/disposal facility.
3. Transport explosives-contaminated and explosives plus metals contaminated soils to a temporary on-site treatment facility.
4. Process the explosive contaminated soils through a low temperature thermal desorption unit or a temporary Biological Treatment unit.
5. Process the explosives plus metals contaminated soils through a solidification/stabilization unit.
6. Dispose of the treated soils in the Soil Repository (Trench 6), under another synthetic landfill cap, or elsewhere on-site as appropriate.

Operable Unit #2: In 1994, the Army proposed more immediate removal actions for several of the contaminated areas at the facility. Nine removal actions have been started or completed by the end of 1998. This included removal actions for all the registry sites, which began in 1995 at the herbicide pit and in 1996 at the other three sites. Removal actions were completed at two other non-registry sites prior to the ROD. EPA signed the Record of Decision (ROD) for Operable Unit #2 on March 4, 1998. The selected interim remedy includes:

1. Excavation of contaminated soils from 15 remediation areas and restoration of the excavated areas. Removal actions were completed at three of these areas in 1998.
2. Segregation of excavated soils according to contaminant type and concentration.
3. Temporary storage of the most highly contaminated soils in the on-site CAMU (Trench 7).
4. Permanent disposal of soils contaminated at lesser levels in the on-site Soil Repository (Trench 6) or in the on-site Inert Landfill.
5. Permanent disposal of metals-contaminated soils that require Solidification/stabilization in Trench 6.

Operable Unit #3: The Groundwater OU#3 addresses contamination of groundwater within the IAAP boundaries and potentially off-site. The Final Supplemental Groundwater RI was submitted in December 199. EPA has requested additional data to complete the RI/FS.

As an interim measure, the Army is providing bottled water to off-site residences with contaminated well water. The Army has offered to pay to connect the residents on the south side of the facility to the public water supply currently being constructed in the area.

Operable Unit #4: The Installation-Wide OU#4 addresses other unacceptable risks not addressed in OU#1 or OU#3. EPA has requested additional data to complete the RI/FS.

Registry Site Removal Actions:

Removal actions that have been conducted at the four registry sites include.

> **Installation Landfill (Inert Landfill)**: The removal action at the landfill was initiated in March 1996 will continue for several years. The remaining open part of Trench 6 was reconstructed in 1996 as a RCRA disposal cell. Approximately 38,000 cubic yards of material have been disposed in Trench 6 through 1998. A temporary stockpile (Trench 7) was constructed in 1996 just west of the Trench 6. Soils treated to reduce toxicity and disposed on-site after the interim soil removal activities are completed at the site. Approximately

8,000 cubic yards of material have been placed in Trench 7 through 1998. The used part of landfill (including the previously capped part of Trench 5) was capped in 1997 according to the requirements of RCRA. The random fill used to complete the surface included approximately 62,000 cubic yards of lightly contaminated soil and sediment excavated from the Line 800 Lagoon and former Line 1 Impoundment. This landfill cover includes geosynthetic layers together with a clay cap.

Pink Water Lagoon: The Line 800 Pink water Lagoon was an unlined five-acre impoundment, four feet deep, and surrounded by an earthen berm. A leaching field and evaporation furrows were originally constructed in 1943 and received wastes until 1955. In 1960, the leaching field was converted to a lagoon by construction of the berm. This site received explosive-contaminated wastewater from Line 800 and sludge from other IAAP operations until 1970. The red/pink wastewater from TNT operations is listed as K047. About 4.1 million gallons of water were contained in the five-acre lagoon prior to the removal action. An RI/FS was conducted at this site in 1989, but some additional investigation and assessment were required as part of the ongoing RI/FS. After dewatering the lagoon, approximately 74,730 cubic yards of contaminated soil were excavated from March to December 1997. Approximately 6,800 CY were placed in Trench 7 for further treatment. Trench 6 received 12,130 CY and the remaining 55,800 CY were used as random fill in the landfill. After the soil excavation the lagoon was developed as a wetland.

In 1998 a berm was constructed to separate the southwestern end from the main lagoon. The southwestern end was segregated from the main lagoon because hot spots of explosives were detected in both surface water and soil in this area. In 1999, RDX levels in the main part of the lagoon varied from 30 ug/l in the winter to 2 ug/l in the summer.

During the installation of monitoring wells downstream from lagoon, high levels of TNT were discovered in soil at depth at the location of former settling basin. Assessment of the extent of deep soil contamination in four downstream settling basins in October 1999. An estimated 1,000 CY will need to be excavated and taken for treatment in Trench 7 of the IDA.

RDX Brush Creek Site (Line 1 Impoundment): Line 1 generated the greatest volume of explosive waste and pink water at IAAP from 1948 through 1975. The impoundment was created by the construction of an earthen dam across Brush Creek in 1948. The impoundment extended from 1,300 to 2,400 feet upstream, depending on flow conditions. Explosive-contaminated water (K047) was routed to the containment area. Explosive material was settled out in the containment area. Fly ash and activated carbon were added to the effluent from the containment area to treat the remaining explosive material. In 1957 a treatment system was installed and the use of the impoundment was eliminated. The embankment was breached in 1975.

An RI/FS was conducted at this site in 1989, but some additional investigation and assessment were required as part of the ongoing RI/FS. Approximately 8,270 cubic yards of contaminated soil were excavated in February and March 1997. Approximately 620 CY were placed in Trench 7 for further treatment. Trench 6 received 1,230 CY and the remaining 6,420 CY were used as random fill in the landfill. After the soil excavation the area was developed as a wetland. Baseline monitoring of sediment, plant tissues, and water was conducted in October 1998.

Sedimentation ponds are though to have existed above the Line I Impoundment**.** Further investigation in October 1999 to determine the location and extent of soil contamination in these areas.

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Herbicide/Pesticide Pit: This site was constructed in 1968 by excavating a small six-by-six foot pit. Heavy polyethylene was used to line the three-foot deep pit. The pit was filled with coarse limestone and had an overhead rain shelter. The disposal of pesticides was discontinued in 1974 and the rain shelter was removed in 1976. A complete removal action was completed in the spring of 1995. Approximately 150 cubic yards of pesticide-contaminated soil were excavated in 1995 and transported to an off-site incinerator for proper disposal.

In 2000, the Department of Energy (DOE) and the Army conducted supplemental investigation concerning the potential release of radioactive compounds during operations by the Atomic Energy Commission.

2002: Department of Energy (DOE) and the Army performed a radiological fly-over of the entire 30 square miles using a helicopter equipped with gamma radiation detectors. Results will be published in June 2003.

2003: Received Supplemental Remedial Investigation Plan for the Incendiary Disposal Area, Fly Ash Waste Pile, Possible Demolition Area, and Line 3A Pond. Received the results for the Aerial Radiological Survey and they indicated no other areas of radiation contamination other than the coal pile and the depleted uranium storage area. Formerly Utilized Sites Remedial Action Program (FUSRAP) funding began for the Department of Energy (DoE) sites formerly known as the Atomic Energy Commission. The DoE has delegated the Army Corps of Engineers as the federal agency to administer the FUSRAP program. A new federal facility agreement will be negotiated to cover this new funding source. The Off-Site Feasibility Study was submitted. The Baseline Ecological Risk Assessment was submitted.

In 2004 the Iowa Army Ammunition Plant awarded Tetra Tech Inc. with a performance-based contract to complete the Superfund assessment and remedial efforts until the site is removed from the National Priorities List.

The process sites within the Iowa Army Ammunition Plant used by the Former Atomic Energy Commission have been removed from the responsibility of the U.S. Army and now are the responsibility of the U.S. Department of Energy. A new Superfund Federal Facility Agreement has been drafted for these specific sites and the Army Corps of Engineers have been tasked by the Department of Energy to assess and if needed remediate these specific locations.

2007: Soil remediation at the Pink Water Lagoon (Line 800), RDX Brush Creek Site (Former Line #1 Impoundment), and Herbicide/Pesticide Pit have been completed and groundwater monitoring results continue to show decreasing trends in the level of RDX. Both the Pink Water Lagoon and the Brush Creek operable units (OUs) will be soon be reclassified as "d'.

2008: Other then long terms monitoring no other environmental assessment or remedial actions are required for the specific locations in this report. The inert landfill will be capped by the end of 2009.